A

LETTER

TO THE

Practiſers, Promoters, and Learners

OF

NAVIGATION.

CONTAINING

A Double View of *Navigation* and *Nautical Aſtronomy*, by which all the Problems of thoſe Branches of *Practical Mathematicks* are Solv'd only by Tabular Inſpection,

In a Book lately publiſh'd, entitled,

Compendium Artis Nauticæ, &c.

The Problems are here truly wrought by TRIGONOMETRY, and compar'd with the ſaid Anſwers by Inſpection, whereby the great Difference in Calculation, and the near Correſpondence of the Solutions, evidently demonſtrate, That all the Propoſitions uſeful at SEA are with more Eaſe and Expedition ſolv'd by *Inſpection*, than by any other Method, and as True as any Way that is commonly uſed; and therefore more fit for Practice than the Methods generally applauded.

By JOHN COLLIER, *Navigator, Surveyor*, and *Teacher of the* MATHEMATICKS.

TU erits mihi Mag[illegible] Apollo.

Printed by *W. Pearſon*, for the Author. 1730. Price 6*d*.

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TU ades mihi Musa Apollo.

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A LETTER to the Practisers, Promoters, and Learners of Navigation, &c.

HAVING lately Publish'd a Treatise of two Sheets in large *Quarto*, entitled, *Compendium Artis Nauticæ*, being the Daily Practice of the Whole Art of *Navigation*, whereby all the Problems of that Art, and *Nautical Astronomy*, practical at Sea, are easily, expeditiously, and exactly perform'd, only by *Tabular Inspection*, without any Operation of *Plain* or *Spherical Trigonometry*, each Problem being amply explain'd, and render'd intelligible to the meanest Capacity; so as to enable them to keep an Account of the Ship's Way, both by Plain and *Mercator*-Sailing; all being wholly New, and exactly agreeing with the nicest Methods of Calculation; and may readily be apply'd to most Parts of Practical *Mathematicks*: And having met with ample Encouragement from many Experienc'd Artists, particularly from several Commanders and Mates of *India* Ships, for whose Use the Astronomical part of the said Treatise was chiefly design'd; and from some other Ingenious Gentlemen, who have taken the Pains maturely to consider the Curiosity of every Part of the said Treatise; by whom, and the Advice of some other Friends and Acquaintance, (who are no Strangers to Mathematical Performances) I am perswaded to shew a Publick Specimen of my Work, and compare it with the Common Trigonometrical Calculation, whereby the Ignorant, as well as the Judicious, may be throughly satisfied of the Ease and Truth of this New Method of Capital Operation, and the Preference it hath to the Common Way of Teaching, and Working the said Art.

In this new Treatise of readily dispatching, by Tabular Inspection, the Useful Problems of *Navigation* and *Astronomy*, you will find in the five first Pages thereof (following the Title, Dedication, and Preface) a Summary, or an Account of the many Difficulties the Careful Sailor labours under, before he can nearly adjust the Course and Distance the Ship hath made good in any propos'd Time. In 32 Pages following are contain'd the Tables, by which all the Properties of the Nautical part of this Treatise are answer'd. From thence to Page 58, you are fully instructed how to Estimate the Ship's Course, and Distance run for 24 Hours,

Hours, (for the True Course and Distance is as difficult to find at Sea as the Longitude of the Place by Observation of any Celestial Object) tho' this most Useful Proposition is carelessly run over by most Authors on this Subject, and no more said on it by them, than, That the Course you will always know by the Compass; and the Distance run, by the Log-line and half-minute Glass. All the Useful and Practical Problems in *Navigation* are contain'd between this and the 82d Page, where you will meet with proper Examples, and with Good and Ample Instructions how to perform them.

And now I shall not at this time run over all the different Problems of Plain and *Mercator*-Sailing, as I have Artfully ranged them in the said Treatise, but shall only compare the Work of my last Problem (which in general contains the whole Art of *Navigation*) with the common Method of Calculation; the Symetry of which is a sufficient Demonstration of the Truth of all the rest, or preceding Problems, on which this Compound one entirely depends.

Probl. VI. Mercator-*Sailing*, *Navigation by Inspection.*

A Ship from the *Lyzard*, in the Latitude of 49° : 55′ N°. Longitude 5° : 14′ wt. is bound to Cape *Finister*, in the Latitude of 43 : 06 N°, Longitude 10 : 00 wt. She sails S. W. by S. Distance 50 Miles; What is her Latitude and Longitude come into, with the Bearings-off and Distance to Cape *Finister*?

Answer. Her Latitude come into is 49° : 13 N°, Longitude 5° : 57 wt.

Cape *Finister* bears S. 24° : 27′ wt. Distance 403 Miles.

Note, These answers, by my Method and Tables, are got in one Line of Figures, and in two or three Minutes time at longest.

Now let us solve the same the Common Way by *Trigonometry*.

Cannon 1.	As Radius	——	90° : 00′	—	10.00000
	Is to the Distance,	——	50′	—	1.69897
	So is the Cosine of the Course,		33 : 45	—	9.91984
	To the Difference of Latitude,		42	—	1.61881

Latitude come from 49° : 55′ N° Meridional Parts 3467
Difference of Lat. 0 : 42 S° Substract.
Latitude come into, 49 : 13 N° Meridional Parts 3402 Subst.
Meridional Difference of Latitude —— 65. Then, by

Can. 2.	Radius	——	90 : 00	—	10.00000	Long. come from	5° : 14′ wt.
	Merid. Diff. Lat.	—	65	——	1.81291	Diff. Longit.	0 : 43 wt. add
	Tangent Course		33 : 45	—	9.82489	Longit. come into	5 : 57 wt.
	Diff. Longitude		43	—	1.63780		

Lat. come into	49° : 13′ N°	Merid. Parts	3402	Long. come into	5° : 57′ wt.
Lat. bound to	43 : 06 N°	Merid. Parts	2871	Long. bound to	10 : 00 wt.
Diff. Latitude	6 : 07	Mer. Dif. Lat.	531	Diff. Longitude	4 : 03
	60				60
In Miles	367 S°.			In Miles	243 wt.

Then by

Can.

Can. 3.	Mer. diff. Lat.	531	— 2.72509	*Can.* 4.	Cosine Bearings	24:35	— 9.95873
	Radius ——	90:00	— 10.00000		True Diff. Latit.	367	— 2.56466
	Diff. Longit. ——	243	— 2.38560		Radius ——	90:00	— 10.00000
	Tang. Bearings	24:35	— 9.66051		Distance ——	404	— 2.60593

Now, after all this Buſtle of working four *Proportions*, or *Cannons*, with the intermix'd Work of *Addition*, or *Subſtraction*, you will find the Latitude, and Longitude come into, to agree with my Anſwers by Inſpection to a Minute; and, that I reckon her Port, or Cape *Finiſter*, to bear only two Minutes farther from the South, and one Mile leſs in Diſtance, than is found by theſe Long and Tedious Operations; which are ſuch inconſiderable Trifles, that every Perſon into whoſe Hands theſe Papers may happen, tho' byaſs'd by Self-Intereſt, or any other Partiality, muſt readily allow the Preference to the Tabular Inſpection.

And now, ſince my Tables have anſwer'd *Navigation*, (which is perform'd by plain *Trigonometry*) to a Nicety, let us examine how near they will come to the Calculation of *Spherical Triangles*, and that both in Right and Oblique-angled, which by the Common Way is attended with greater Difficulty: In doing which, I will tack all the *Nautical Problems* of *Aſtronomy* together, to ſave both Time and Trouble; which, with the Tables and their Uſes, the Definitions of the Terms, with the Problems and Rules to perform them, bring us to the 111th Page of the aforeſaid Treatiſe.

Aſtronomical PROBLEMS.

LET the Latitude of the Place be 42° : 11' N°, the Sun's Declination 8° : 34 N°; What is the Sun's true Amplitude, the Sun's Difference of Aſcenſion; the Sun's Altitude and Azimuth at Six; the Sun's Altitude and Hour at Eaſt? When the Altitude is 8° : 40', what is the Azimuth? And at 8 in the Morning, what is the Altitude?

Anſwer 1. The Sun's true Amplitude is —— E 11° : 37' N°
2. The Sun's Difference of Aſcenſion is 0h : 31' : 21".
3. The Sun's Altitude at Six is —— 5 : 44
4. The Sun's Azimuth at Six is —— E 6 : 22 N°
5. The Sun's Altitude at Eaſt is —— 12 : 48
6. The Time from Six at Eaſt is —— 0h : 38' : 12".
7. The Sun's Altitude, 8° : 40', the Azimuth is, E 3 : 47 N°.
8. At Eight in the Morning the Altitude is, 27 : 48

Note, All theſe Anſwers are ſolv'd by Head, without any previous Calculation; and any ſingle Anſwer is had, or made, in as little Time as the Queſtion is ask'd in. Let us now do the ſame by the Tables of Artificial *Sines* and *Tangents*.

1. *To find the* Sun's *true Amplitude.*

Can. Cofine Latit.	42° : 11′	9. 86981	Here you fee the Sun's Amplitude
Sine Sun's Decl.	8 : 34	9. 17306	is only 1 Minute nearer the Eaft than
Radius	90 : 00	10. 00000	my fhort Method. See Page 5.
Sine Sun's Ampl.	11 : 36	9. 30325	

2. *To find the* Sun's *Difference of Aſcenſion.*

Can. Cotang. Latit.	42 : 11	10. 04276	Which 7° : 51′ muſt be reduced
Tang. Sun's Decl.	8 : 34	9. 17794	into Time, and is 0h : 31′ : 24″, on-
Radius	90 : 00	10. 00000	ly 3 Seconds of Time more than my
Sine Sun's Diff. Aſcen.	7 : 51	9. 13518	fhort Work. See Page 5.

3. *To find the* Sun's *Altitude at Six.*

Can. Radius	90 : 00	10. 00000	By this *Canon* the Sun at Six is
Sine Sun's Dec.	8 : 34	9. 17306	only 1 Minute higher than I have
Sine Latit.	42 : 11	9. 82718	aſſerted before. See Page 5.
Sine Sun's Altit.	5 : 45	9. 00024	

4. *To find the* Sun's *Azimuth at Six.*

Can. Cofine Lat.	42 : 00	9. 86981	Exactly agreeing with my Operation
Radius	90 : 00	10. 00000	by Head. See Page 5.
Cotang. Sun's Decl.	8 : 34	10. 82205	
Cotang. Sun's Azimuth	6 : 22	10. 95224	

5. *To find the* Sun's *Altitude at Eaſt and Weſt.*

Can. Sine Latit.	42 : 11	6. 82704	By this Proportion the Sun is only
Sine Sun's Decl.	8 : 34	9. 17308	1 Minute higher, at Eaſt and Weſt,
Radius	90 : 00	10. 00000	than what I had anſwer'd before.
Sine Sun's Altit.	12 : 49	9. 34602	See Page 5.

6. *To find the Hour at Eaſt and Weſt.*

Can. Tang. Latit.	42 : 11	9. 95723	This 9° : 51′ reduced into Time,
Tang. Sun's Dec.	8 : 34	9. 17794	is 0h : 38′ : 16″; only 4 ſeconds of
Radius	90 : 00	10. 00000	Time more than the Calculation by
Sine Hour from 6	9 : 36	9. 22071	Inſpection. See Page 5.

Theſe

These six *Cannons* being produced from Right-angled Spherical Triangles, are the easiest of that sort of Calculation, each Quæsita being found by one Proportion, and the *Radius* being one of the Terms of each *Cannon*.

The following sought Properties are found with more Labour and greater Difficulty, as will be plainly evident by the Work; tho' by my Method, by Head, they are found by my Tables with the same Ease and Expedition as any of the foregoing Answers, in Page 5.

7. *To find the* Sun's *Azimuth when the Altitude is* 8° : 40'

Operation. Comp. Lat. 47° : 49' —— Sine 0. 13018 Comp. Arith.
Comp. Alt. 81 : 20 —— Sine 0. 00498 Comp. Arith.
Comp. Decl. 81 : 26

Summ —— 210 : 35

½ Summ —— 105 : 17 : 30 —— Sine 9. 98434
½ Sum less Comp. Dec. 23 : 51 : 30 —— Sine 9. 60689

Summ —— 19. 72639

½ Summ —— 9. 86319, which is the Cosine of 43° : 08 whose Double is 86° : 16', *viz.* the Sun's Azimuth from the Elevated Pole; and therefore, in this Example from the North, whose Compliment 3° : 44' is the Sun's Azimuth from the East; only two Minutes nearer the East than is found by my Easie Head-work, which by the most Scrupulous must be counted inconsiderable, when compared to the tedious Solution of so requisite a Quæsita, being of frequent Use in long Voyages, where Azimuth-Compasses are necessary, towards finding the Variation of those Compasses they conduct themselves with over the boisterous Main.

Note, There is another Method of solving this *Problem*, by two *Cannons*, but that is not so commonly used as this is; besides, I take this to be the Easier of the two, for which reason I here incerted it, being unwilling any Cavil should arise about these Spherical Solutions, having, to gain each Quæsita, taken the shortest Way that was used, and publish'd before I launched my New Treatise into the wide World.

8. *To find the* Sun's *Altitude at Eight in the Morning.*

Can. 1.	Cosine Hour from Noon	60° : 00'	9. 69897	
	Radius ——	90 : 00	10. 00000	
	Tangent Latitude	42 : 11	9. 95723	
	Cotangent 4th Number	28 : 53	10. 25826	
	which taken from ——	81 : 26,	the Distance of the Sun from the Ele-	
	vated Pole, remains ——	52 : 33.	Then say by	
Can. 2.	Cosine 4th Num.	28 : 53	0. 05769	Comp. Arith.
	Cosine Remainder	52 : 33	9. 78395	
	Sine Latitude ——	42 : 11	9. 82704	
	Sine Sun's Altitude	27 : 48	9. 66868.	Here, you see, I have found

by

by one Eaſie Operation in my Head, the exact Altitude of the *Sun* at Eight in the Morning, and at Four in the Evening; which by this Method of two *Cannons* doth take up both Paper and Time, and is attended with ſome Difficulty.

There is another Way of doing this laſt and 8th Quæſita, by three *Cannons*, but every Perſon will allow that Two is leſs than Three; and therefore This Method muſt be preferable to That, as Mine muſt be to This, which is done without any Trouble.

And now, having compared my Eaſie Operations with theſe Cannonical Solutions, and finding ſo very little Difference in the different Anſwers, I am certain (or rather flatter my ſelf) that nothing but downright Superſtition can be ſo much bigotted to old Cuſtom, as to prefer the *latter* (attended with theſe apparent Difficulties) before the *former*; where every Operation is plain, and perform'd only by Head, without the Repetition of any Proportion, or the uſe of a multiplicity of Figures.

For by my Method you will have a ready and true Anſwer to any Demand, without calling for Pen, Ink, and Paper, which may perhaps be ſome Time before you can come at them; and then you muſt have recourſe to ſome coſtly Book, where, after a long Search, you may find the *Cannons* that ſolve the *Problem*, with a large Complication of Figures out of the Tables of *Logarithms*, and artificial *Sines* and *Tangents*; where it is Five to One that you miſtake either in taking out the Figures, placeing them down, or in the Addition or Subſtraction of them: And then, to prove your Work, you muſt have a Plane-ſcale and a pair of Compaſſes to project the Queſtion; which, if it ſhould not meaſure right, your whole Operation muſt be work'd by *Gunter*, to find where your Error lay in the *Trigonometrical Solution*; which we will now ſuppoſe by your ſecond going over you have found out, and are able to juſtifie a True Anſwer, becauſe your Projection and Calculation correſpond with each other. But no body can deny the Tedioufneſs of this Work, or can have the Front to juſtifie it againſt a Method where we never uſe any Number greater than 1000, and never ſhall have occaſion for any Number that can reach 10 (that is found in the ſame Column) to add to a Number exceeding 990; as all my Anſwers are ſolv'd by. This is a ſufficient Proof, that my Tabular Method ought to have the Preheminence.

But, as few New Methods come into the World (tho' never ſo valuable) without ſome Objections, and ſome ignorant carping *Momus* may ſecretly buzz in the Ears of thoſe that are as ignorant as himſelf, ſome Things to the Diſadvantage of this great Performance; I think my ſelf bound in Juſtice to anſwer ſome that have already reach'd my Ears; as, "How "ſhall We be ſatisfied of the Truth of his Anſwers in all Caſes? Indeed, he hath anſwer'd "to admiration in theſe Solutions; but, may be, this is only One Caſe in a Thouſand he can "anſwer ſo nearly; which he has luckily hit upon, and thruſt into the Hands of the Publick; "he will be wide in his Anſwers, if you ſhould change the *Data*, &c.

To ſuch Objections I anſwer, There is not any one ſingle Propoſition in the *Elements of Geometry* more true in it ſelf, than the Rules I have given in the ſaid Treatiſe; and I can as mathematically demonſtrate the Truth of each ſingle Proceſs as any one can, any one Propoſition in the Fifteen Books of *Euclid*, and would have publiſh'd the Demonſtration in the ſaid Treatiſe, had it not been for the Advice of a Friend, who over-ruled me with this Argument, That while I conceal'd the Demonſtration, the Invention would be look'd upon as entirely my own; but ſhould I once make it publick, then every Mathematician, that could attain

tain to it, would claim it as his own, pretending he knew these Things before, but was unwilling to make such Useful Parts of the *Mathematicks*, as *Navigation* and *Astronomy* are, too Easie and Common: And therefore, as yet there can be no Objection made against it; being ready to demonstrate the Whole, or any Part thereof, to any one that requires it, at an Easie rate; as will be seen hereafter.

And now, since I have not Publickly demonstrated the Truth of my Operations, some Speculative Objectors may say, "Here is no Demonstration, which we may meet with "sometimes in some Authors; here is only *Rule*, which may presently slip out of Head; "and therefore this Treatise is of little or no use to the Practical Sailor, who ought to "have *Reason* for all he says or does, since the Safety of *Life*, *Ship*, and *Cargo* depends up- "on the Reason and Judgment of the *Commander* and *Mates*, that have the Care and Charge "of Navigating the Ship over the main Ocean.

To this Objection I thus answer: That in the Twenty-five Years I have travers'd the Main, and taught the Art of *Navigation*, most of that Time on the wide Ocean, I never met with above two Persons that would apply themselves to the Study of any more Knowledge than needs must, to carry on the Daily Repetition of those Practices they are necessitated to get their Livelihoods by; and therefore would never consult *Demonstration* upon the most urgent Occasion, but fling it by, as a Thing wholly useless: For, talk of *Demonstration* to them, and they will pertly tell you, *They do not want any; teach them to Do, and not Talk, is all they require.* And I my self have confidently been oppos'd by warranted Teachers in the Royal Navy, and by Others on Shore, That there is no other Way of demonstrating the Common Maxims, or Axioms of *Plain* and *Spherical Trigonometry*, (which is not only the Basis or Foundation of *Navigation* and *Astronomy*, but of all the other Practical Branches of the *Mathematicks*) but by the Correspondence of the Projection and Calculation, which are True when they answer each other; and therefore Projection demonstrates Calculation, and *vice versa* Calculation, Projection: For, among the whole Clan of those that pretend to teach the Art of *Navigation*, you will scarcely find One in Ten that can fairly demonstrate Geometrically, that the Radius is to the Distance as the Sine of Course is to the Departure. And, among the Practisers of this Art, 'twill be a hard matter to find One in a Hundred that can truly demonstrate the said Proportion, tho' they may have occasion to use the same *Cannon* half a dozen times in each Day's Work at Sea; so little Value do the generality of our most Experienc'd Sailors set upon the Demonstration of those Mathematical Propositions they have occasion for, to perform their Art, and without which they cannot safely sail the untrack'd pathless Ocean; therefore the want of a Mathematical Demonstration, among the Commonality of Sailors, cannot be made any Objection against this said *Tabular Treatise*, in respect of the usual Methods of performing their Art; for if a Sailor can by any means reduce the various Courses and Distances the Ship hath run, or made good, in any propos'd Time, into one True Course and Distance, and by that said Course and Distance find the Latitude and Longitude the Ship is come into; and then find the Bearings-off, and Distance to, any Port, Cape, Rock, Sand, or Shoal he would willingly make or avoid; he is Master of his Art, and able to conduct the Ship from one Port to another. And therefore, since my Tables are adapted for that Use better than any others are, I think they ought, and I doubt not but they will have the Preference, when they are once known.

And now, since 'tis certain that Sailors will learn and practise the Art of *Navigation* more by *Rule* than by *Reason*, 'tis necessary now to be known, Whether the Method I have ob-

ſery'd throughout the ſaid Treatiſe is of more Service or Advantage to them than the Methods they frequently meet with in other Authors?

Firſt then, I have explain'd all the Uſual and Common Terms of *Navigation* and *Aſtronomy*, both by *Reaſon* and *Rule*, and that more conciſely, I may confidently ſay, than any other Author now extant: For, from a proper Scheme peculiar to each Branch, I have as *Naturally* as *Mathematically* demonſtrated the nature of the Ship's encreaſing or decreaſing her Latitude and Longitude; of finding the Difference of Latitude, and the Difference of Longitude, between any two Places; and whether the former is *North* or *South*, the latter *Eaſt* or *Weſt*; and conſequently, in what Quarter of the Compaſs the Ship muſt make her Way good, to run from one Port to another: When the *Sun* riſes to the Northward, and when to the Southward, of the Eaſt; and, whether before or after Six, and all the Accidents that can happen about its ſetting, or at any other time when you may have occaſion to uſe the *Sun*. From which Reaſoning I have deduced proper *Rules* to be made uſe of by thoſe that will not take the Trouble deliberately to contemplate on the ſaid Reaſoning; and therefore, I think, there needs not any thing more to be ſaid in reſpect of this Article, to prove its Validity againſt all Objections.

Secondly, All the Operations for finding the Ship's true Courſe and Diſtance run, or nearly eſtimating the ſame for any propos'd Time, are explain'd in Eaſie and Proper Terms, both by *Reaſon* and *Rule*, drawn from a Proper Figure in each Example, rendering the Work aptly intelligible to a young Learner, tho' of the meaneſt Capacity, there being no greater Difficulty in it than *Addition* or *Subſtraction*, which muſt be underſtood by thoſe that will joyn indifferent Attention to thoſe Inſtructions they do there find.

Thirdly, In each kind of Sailing, I have only made uſe of thoſe *Problems* that are practical and neceſſary towards a True keeping of an Account of the Ship's Way by that Sailing; each *Problem* perform'd and explain'd ſingly by it ſelf, without inſerting any *impractical* (or rather *impoſſible*) Propoſitions, it being altogether impoſſible, by any Art we are at preſent Maſters of, to attain the *Data*; a Thing too much practis'd by common Authors, and by all Teachers: And at the end of each Kind of Sailing you will find a Type or Synopſis of the whole Art, whereby an Account of the Daily Run of the Ship, her Latitude and Longitude come into, with the Bearings and Diſtance to her Port, or neareſt Land, is found with little or no Trouble, each Days-work being kept in one Line of Figures; and all the Requiſites for that Day is done in one Minute, having firſt attain'd the Courſe and Diſtance the Ship hath made good in the 24 Hours, according to the beſt of your Judgment; and all this in a much-preferable manner to any other yet extant.

Fourthly, All the *Rules* made uſe of for ſolving the *Aſtronomical Problems* are as ſhort, and as eaſie as the *Pater-noſter*, and therefore neither hard to remember or uſe in Practice; and if you meet with any Superfluity throughout the whole Treatiſe, 'tis in this Part. And I will now imagine ſome careleſs Artiſt deſiring an Anſwer to theſe Objections following.

" What Buſineſs has a Sailor to find the Time of the *Sun*'s riſing and ſetting? The Hour " of the Day when the *Sun* is Eaſt or Weſt? The Hour of the Day at any Altitude? Or at " any Hour the Altitude, ſince the *Sun*'s *Amplitude* and *Azimuth* is all the *Aſtronomy* they " have occaſion for, towards finding the Variation of the Compaſs?

To this I answer; Indeed these *Quæsita* are not common, and the Reason I take to be, is, because they are got with some Difficulty the Common Way; for, doubtless, they may be very useful at Sea, particularly after a Storm, or cold rainy Weather, when the common Glasses have not been truly kept, which happens frequently; I need not explain in what manner, that must be obvious to those that use the Sea: And therefore since these, with all the other necessary Quæsita in *Astronomy*, are found without Trouble, only by Head, these Objections are null and (I hope) of no effect, because they may be Useful. Besides, as they take up no Time in solving, nor Trouble in getting the Rule by Art, but rather of the two make the Rule the Easier and Readier for Operation, I presume, if 'tis a Fault, it may be bore with; because the Practisers are left to their own Discretion, to use it, or let it alone.

Fifthly, The Solutions of all the *Problems* may thorowly be understood, and readily perform'd, by one of an Ordinary Capacity, in less Time than he can be instructed to raise the *Cannons* in Right-angled Plain *Trigonometry*, any Side of the Triangle being made the Radius of a Circle; which is only *One* of the *Many* Useless Difficulties the publick Teachers frequently use to puzzle the Brains of their Young Pupils, tho' it is of no more Service in the Practice of *Navigation* or *Astronomy* than Clockwork to a Plowman, or the Knowledge of *Mechanical Powers* to His Majesty's Bear-keeper.

Sixthly, As in the whole Treatise, including the Title, Dedication, Preface, *&c.* there is only Fifteen Sheets, whereas in most Books on this Subject you will have twice or thrice the said number, therefore *This* must be Imperfect, as being impossible in so little a compass to contain the said Art; or, should you find herein the Whole Art, then the Rules must be hard to understand, and do want a fuller Interpretation for a Learner. To these Objections I do thus answer: As *Homer* in a Nut-shell (tho' of a Cocoa) is more valuable than all the Volumnious Commentators on him; so *Collier*, in the Shell of a Wall-nut, is as Perfect, and as Plain as all the Bulky Authors on this Subject, whose Books are ready to burst with Useless and Impractical Propositions: And should any Ingenious and Experienc'd Artist take the Trouble to weed the most *applauded Book* hereon, of the *wild* and *unsavoury* Stuff he may meet therein, he will scarce find *any* more for Use, than what you now have in the 4th and 5th Pages of this Letter.

And now we are talking of *Books*, 'twill not, I think, be amiss in this place to put down those that are enquir'd after, with their Prices, whereby the Practisers of this Art may see how they are impos'd upon, in purchasing *various Books*, when *one single one*, at an Easie Price, will answer all they require.

The Seaman's Kalendar	0 : 2 : 0	*Newhouse*'s Art of Navigation,	0 : 5 : 0
Atkinson's Epitomy	0 : 4 : 0	The Mariner's Compass rectified,	0 : 2 : 0
Seller's Practical Navigation	0 : 5 : 0	*Hudson*'s Theory	0 : 14 : 0

Cum multis aliis.

Not One of these will answer all that is requir'd in the Practice of *Navigation* and *Astronamy*; but some Particular and Useful Tables are omitted, purely to run the Purchaser and thorow Sailor to the Charge of more than One; and then all they perform is attended with Tediousness and Difficulty; to appease which, you are refer'd to a *Gunter*, or Sliding-Rule. And therefore *Tabular Inspection* must indisputably have the Advantage; and is sold by *J. Harbin* at *Charing-Cross*, *B. Motte* at *Temple-bar*, *T. Symons* at *Bow-Church*, *W. Meadows* in *Cornhill*, *S. Fitzer* in the *Minories*, *C. Digby* at the *Hermitage*, *G. Baldwin* at *Ratcliff-Cross*,

Cross, and by Mrs. *Brumwell*, near the *Goat and Shears* the back-side of St. *Thomas Apostle's*, Price bound 3 *s.* and 2 *s.* in Sheets, fized to bind with this Letter.

And now, for the Encouragement of those that are desirous to be thorowly qualified in this Art, by this New, True, Easie, and Expeditious Method of *Capital Calculation*, I do hereby engage my self to Teach any Person (ready in the Principles of *Arithmetick*) the First *Problem* he comes at, that he cannot understand by the Instructions in the Book, *gratis*; conditionally he buys the Book of me, at the *Swan* against the Pump in *Leadenhall-street*, where a Penny-post Letter sent, or a Note of Advice left, I will wait on any Person at their own Time and Dwelling.

For those who cannot learn by Book, but must have Vocal Instruction, I likewise engage my self to teach them all the *Problems* in the said Treatise, (which are Thirty) with the Use of the *Plain* and *Mercator* Charts, for *One Guinea*; conditionally, as was said before, they are Ready in the Principles of *Arithmetick*.

Any Person that can perform *Navigation* and *Astronomy* the Common Way, may be taught this *Ready Method*, with the Use of both Charts, for *Half a Guinea*.

As the *Astronomical* Part of this Treatise is exactly true, easie to learn, and neeessary to be known by many Persons, who may not have Occasion to put it in Practice in *Navigation*, but may use it as Table-talk, being only a *Ludus Mathematicus*, to pass the Time away with; I do likewise promise to teach them for *Five Shillings*.

And lastly, *Arithmetick*, *Algebra*, and *Geometry*, with their Application to all the Practical Branches of the *Mathematicks*, are Taught on Reasonable Terms; with the *Use* of both *Globes*, and all other Mathematical Instruments: Tradesmen's Work measur'd, and Lands exactly survey'd and plann'd, by the said Author.

Any Person that ever had Charge of a Ship, and hath kept an Account of her Way at Sea, that will buy One Dozen at 36 Shillings, I will wait on him at his Leisure, and thorowly qualifie him in this Art by this Method.

And any Commander, or Master of a Ship or Vessel, that will buy One Dozen of them at 42 Shillings, I will engage to Teach his Servant, or Cabin-boy, (who generally are their Apprentices, and they are mostly oblig'd to instruct them in this Art by Indenture) all that's contain'd in the said Treatise, when they are perfect in *Addition*, *Substraction*, *Multiplication*, and *Division*; as hath been said in some Articles before mention'd.

Note, These Books may turn to Advantage to the Purchasers who use foreign Voyages, particularly to any of our Colonies or Plantations abroad in *America*, or in the *East-Indies*, where they may vend them with great Profit, to the Commanders and Mates of those Country Ships; and to any of our Home-Traders, using only those Ports that belong to the Crown of *Great-Britain*, &c. by selling them to the Booksellers, or Teachers of *Navigation* in those Ports: And if they sell them at the same Price they bought 'em, then they, or their Servants, are Taught this Curious Method of performing the whole *Art of Navigation*, Free-cost.

10 IY 65

Compendium Artis Nauticæ *you see*
Doth Truely answer Trigonometry;
And Tabular Inspection *doth excell*;
And Noviter non Nova *bears the Bell.*

FINIS.